

CLAIMS

- 1 1. A reconfigurable ball bat comprising:
2 a center tube including a handle portion;
3 a barrel assembly comprising:
4 a transition piece;
5 an end cap;
6 a barrel removably connected to the end cap at a distal end of the barrel,
7 the barrel connected to the transition piece at a proximal end of the barrel; and
8 wherein the barrel assembly is removably supported as a unit on the center tube by
9 the transition piece and the end cap.
- 1 2. The reconfigurable ball bat of claim 1, further comprising:
2 an end plug having a body in a form of a shaft and a head connected to the body;
3 the body fixed in a distal end of the center tube; and
4 the head protruding from the distal end of the center tube and engaged with the
5 end cap.
- 1 3. The reconfigurable ball bat of claim 2, further comprising:
2 an elongate slot in the end cap;
3 the head having an elongate configuration; and
4 wherein the head fits into the slot in an interlocking relation.
- 1 4. The reconfigurable ball bat of claim 3, further comprising at least one anti-rotation
2 fitting inserted in the elongate slot and holding the head in the interlocked relation against
3 rotation.
- 1 5. The reconfiguration ball bat of claim 4, wherein the at least one anti-rotation
2 fitting is held in the elongate slot by a set screw engaging the anti-rotation fitting and the
3 end plug.

- 1 6. The reconfigurable ball bat of claim 2, further comprising:
2 an opening in the end cap for receiving the center tube therethrough;
3 wherein the head of the end plug is larger than the opening in the end cap and
4 cannot pass through the end cap so that the end cap is mounted on the center tube by
5 passing the end cap over a proximal end of the center tube with a knob removed.
- 1 7. The reconfigurable ball bat of claim 6, further comprising:
2 a threaded element on the center tube;
3 a nut for engagement with the threaded element;
4 wherein the barrel assembly including the end cap is passed over the proximal end
5 of the center tube and moved distally until the end cap engages the head of the end plug;
6 the barrel assembly is held in place on the center tube by the nut after the barrel
7 assembly and the nut have been moved distally over the center tube.
- 1 8. The reconfigurable ball bat of claim 6, wherein the head further comprises a non-
2 circular structure engaged with structure in the end cap to prevent relative rotational
3 movement between the end cap and the end plug.
- 1 9. The reconfigurable ball bat of claim 1, further comprising a ballast supported on
2 at least one of the end cap and the transition piece.
- 1 10. The reconfigurable ball bat of claim 9, wherein:
2 each of the end cap and transition piece has a engagement structure; and
3 the ballast engages the engagement structure on each of the end cap and the
4 transition piece.
- 1 11. The reconfigurable ball bat of claim 1, further comprising a ballast, wherein the
2 ballast is concentric with and is disposed within the barrel.

- 1 12. The reconfigurable ball bat of claim 10, wherein:
2 the ballast has a tubular configuration; and
3 the ballast is disposed between the barrel and the center tube.
- 1 13. The reconfigurable ball bat of claim 1, wherein the barrel has an inner diameter of
2 approximately two inches and an outer diameter of approximately two and a quarter
3 inches.
- 1 14. The reconfigurable ball bat of claim 1, wherein the barrel comprises a
2 thermoplastic material.
- 1 15. The reconfigurable ball bat of claim 14, wherein the barrel comprises a
2 polycarbonate material.
- 1 16. The reconfigurable ball bat of claim 14, wherein the barrel comprises a
2 polyurethane material.
- 1 17. The reconfigurable ball bat of claim 16, wherein the barrel comprises a
2 reinforcing material.
- 1 18. The reconfigurable ball bat of claim 1, wherein the center tube has an inner
2 diameter in a range from approximately .500 inch to approximately .715 inch.
- 1 19. The reconfigurable ball bat of claim 1, wherein the center tube has an outer
2 diameter in a range from approximately .75 inch to approximately 1.00 inch.
- 1 20. The reconfigurable ball bat of claim 1, wherein the center tube comprises an
2 aluminum material.
- 1 21. The reconfigurable ball bat of claim 1, wherein the center tube comprises a
2 composite material.

- 1 22. The reconfigurable ball bat of claim 21, wherein the center tube comprises an
2 aluminum inner portion and a reinforcing fiber outer layer.
- 1 23. The reconfigurable ball bat of claim 1, wherein the center tube comprises a
2 thermoplastic material.
- 1 24. The reconfigurable ball bat of claim 1, wherein the center tube is fiber reinforced.
- 1 25. The reconfigurable ball bat of claim 1, wherein:
2 the end cap and the transition piece have respective bearing surfaces with
3 respective minimum diameters; and
4 the barrel is a straight cylindrical barrel and engages the end cap and the transition
5 piece at a diameter greater than or equal to the respective minimum diameters.
- 1 26. The reconfigurable ball bat of claim 1, further comprising a ballast located
2 interiorly of the barrel to provide a predetermined weight along a length of the barrel.
- 1 27. The reconfigurable ball bat of claim 26, wherein the ballast seals an inner surface
2 of the barrel and surrounds the center tube.
- 1 28. The reconfigurable ball bat of claim 1, wherein the barrel assembly is removably
2 mounted and is removable as a unit.
- 1 29. The reconfigurable ball bat of claim 1, wherein:
2 the barrel assembly further comprising a ballast disposed within the barrel; and
3 the ballast is a non-strengthening member for adding a predetermined weight so
4 that the reconfigurable ball bat weighs less than or equal to 30 ounces.
- 1 30. The reconfigurable ball bat of claim 29 wherein the bat weighs less than or equal
2 to 28 ounces.

1 31. The reconfigurable ball bat of claim 29, wherein the bat weighs less than or equal
2 to 26 ounces.

1 32. The reconfigurable ball bat of claim 29, wherein the bat has a weight in a range
2 from 22 ounces to 24 ounces.

1 33. The reconfigurable ball bat of claim 29, wherein the bat meets the standards of the
2 NCAA for ball bats.

1 34. The reconfigurable ball bat of claim 29, wherein the bat meets the standards of the
2 ASA for ball bats.

1 35. The reconfigurable ball bat of claim 29, wherein:
2 the barrel assembly is a first barrel assembly; and
3 the ball bat further comprises at least one additional barrel assembly so that the
4 ball bat includes a plurality of barrel assemblies that are selectively and removably
5 mounted on the center tube.

1 36. The reconfigurable ball bat of claim 35, wherein the plurality of barrel assemblies
2 have a predetermined variety of weights or playability characteristics.

1 37. The reconfigurable ball bat of claim 1, wherein the transition piece comprises two
2 connectable parts joined together.

1 38. The reconfigurable ball bat of claim 37, wherein the two parts comprise a
2 generally frustoconical part and a radially extending part supporting the frustoconical part
3 in a coaxial configuration relative to the center tube.

1 39. A reconfigurable ball bat kit, comprising:
2 a barrel assembly including:
3 a barrel;
4 an end cap adapted to be supported on the barrel;
5 a transition piece adapted to be supported on the barrel and removably
6 supported on a handle portion of the ball bat; and
7 a ballast adapted to be supported on the end cap and on the transition piece
8 inside the barrel.

1 40. The reconfigurable ball bat kit of claim 39, wherein the ballast is coaxial with the
2 barrel in an assembled state.

1 41. The reconfigurable ball bat kit of claim 39, wherein the ballast has a
2 predetermined weight.

1 42. The reconfigurable ball bat kit of claim 40, wherein:
2 the end cap has a distal engagement structure;
3 the transition piece has a proximal engagement structure, and
4 the ballast is supported at a distal end and at a proximal end by the distal
5 engagement structure and the proximal engagement structure respectively in an
6 assembled state.

1 43. The reconfigurable ball bat kit of claim 39, wherein the ballast is fixed to each of
2 the distal engagement structure and the proximal engagement structure.

1 44. The reconfigurable ball bat kit of claim 39, wherein the ballast is a thin film
2 tubular member having a thickness in a range from ten to one hundred and twenty-five
3 thousandths of an inch.

1 45. The reconfigurable ball bat kit of claim 39, wherein:
2 the barrel assembly is a first barrel assembly; and
3 the reconfigurable ball bat kit further comprising a plurality of barrel assemblies
4 including the first barrel assembly.

1 46. The reconfigurable ball bat kit of claim 45, wherein each of the plurality of barrel
2 assemblies has a different weight and/or a different playability characteristic from at least
3 another of the barrel assemblies.

1 47. The reconfigurable ball bat kit of claim 39, wherein the transition piece comprises
2 two connectable parts adapted to be joined together.

1 48. The reconfigurable ball bat kit of claim 47, wherein the two parts comprise a
2 generally frustoconical part and a radially extending part for supporting the frustoconical
3 part in a coaxial configuration relative to the center tube.

1 49. A method of using a reconfigurable ball bat, the bat having a center tube and a
2 barrel assembly removably mounted on the center tube, the barrel assembly comprising a
3 transition piece, an end cap, a barrel, and a ballast, the method of using the reconfigurable
4 ball bat comprising selecting the barrel assembly in accordance with a desired weight
5 and/or playability of the barrel assembly.

1 50. The method of using of claim 49, wherein the ball bat comprises a plurality of
2 barrel assemblies in which the barrel assembly is a first barrel assembly; the method of
3 using further comprising selecting a barrel assembly from among the plurality of barrel
4 assemblies based on a desired weight and playability.

1 51. The method of using of claim 50, further comprising a preliminary step of
2 assembling at least one of the barrel assemblies.

1 52. The method of using of claim 49, further comprising supporting the barrel
2 assembly on the center tube.

1 53. The method of using of claim 52, further comprising inserting the central tube
2 through the barrel assembly and twisting the center tube relative to the barrel assembly.

1 54. The method of using of claim 53, further comprising:
2 inserting at least one anti-rotation fitting into the end cap; and
3 securing the anti-rotation fitting in the end cap by a set screw.

1 55. The method of using of claim 52, further comprising securing the barrel assembly
2 on the center tube by engaging a blocking nut on the center tube and abutting the
3 transition piece with the nut.

1 56. A method of making a reconfigurable ball bat, the method comprising:
2 performing preliminary steps of assembling a barrel assembly, the preliminary
3 steps including:
4 connecting a transition piece to a proximate end of a barrel;
5 connecting a proximal end of a ballast to an engagement structure of the
6 transition piece;
7 connecting a distal end of the ballast to a engagement structure of an end
8 cap; and
9 connecting an end cap to a distal end of the barrel; and
10 supporting the barrel assembly on a center tube by inserting the center tube
11 through the transition piece, the ballast, and the end cap.

1 57. The method of claim 56, wherein the step of supporting further comprises:
2 inserting the center tube through the transition piece before inserting the center
3 tube through the ballast and the end cap; and
4 inserting the center tube through the ballast before inserting the center tube
5 through the end cap.

- 1 58. The method of claim 56, further comprising:
2 a preliminary step of fixing an end plug in a distal end of the center tube; and
3 connecting the end plug to the end cap.
- 1 59. The method of claim 58, wherein the step of connecting the end plug to the
2 end cap comprises interlocking the end plug with the end cap.
- 1 60. The method of claim 59, wherein the step of interlocking further comprises:
2 inserting the end plug through the end cap; and
3 twisting the center tube and end plug approximately ninety degrees.
- 1 61. The method of claim 59, wherein the step of connecting the end plug to the end
2 cap further comprises securing the end plug in an interlocked position with at least one
3 anti-rotation fitting and at least one set screw.
- 1 62. The method of claim 59, wherein the step of connecting the end plug to the end
2 cap further comprises securing the end plug in an interlocked position with at least two
3 anti-rotation fittings and at least two set screws.
- 1 63. The method of claim 58, wherein the step of connecting the end plug to the end
2 cap further comprises:
3 abutting the end cap on an enlarged head of the end plug; and
4 holding the end cap and the enlarged head in abutting relation by engaging a
5 proximal end of the barrel assembly with a nut.
- 1 64. The method of claim 56, wherein the step of supporting further comprises:
2 inserting the center tube through the end cap before inserting the center tube
3 through the ballast and the transition piece; and
4 inserting the center tube through the ballast before inserting the center tube
5 through the transition piece.

1 65. The method of claim 56, further comprising the steps of:
2 screwing a nut on a sleeve to hold the transition piece against movement in a
3 proximal direction after the step of supporting; and
4 connecting a knob at a proximal end of the center tube.

1 66. The method of claim 56, further comprising the step of assembling the transition
2 piece from two pieces.
